



October 17, 2017

Mr. Anthony Krone  
Risk Manager  
Shelby County Schools  
160 South Hollywood – Room 152  
Memphis, Tennessee 38112

**RE: Lead in Drinking Water Post-Flush Sampling  
Summary Report  
Memphis, Tennessee  
Tioga Project No.: 24816.02**

Dear Mr. Krone,

At the request of Shelby County Schools (the Client), Tioga Environmental Consultants (Tioga) performed sampling of drinking water sources at Dunbar Elementary School, Oakhaven Middle & High Schools, Westwood High School and Whitehaven Elementary School for laboratory analysis of total lead concentrations.

As first-draw sampling of drinking water sources at these schools on September 12<sup>th</sup>, 2017 revealed the potential for elevated lead levels in the potable water systems, Tioga recommended additional sampling of all water fountains in each of these schools to determine the extent of the issue. Following the receipt of the laboratory analytical results from the initial sampling event, Tioga informed Shelby County Schools Risk Management personnel, who instructed maintenance personnel to take the water fountains at these schools out of service pending further testing. Prior to this post-flush sampling event, the water fountains throughout each school had been shut off for multiple weeks.

Initial flush sampling of refrigerated water fountains identified during the previous first-draw sampling as having elevated lead levels in the drinking water was conducted on the evening of September 25<sup>th</sup>, 2017. Prior to sample collection, these refrigerated water fountains were flushed for 15 minutes in order to completely drain the internal holding tanks and obtain samples of water from the lines feeding the fountains.

On September 26<sup>th</sup>, 2017, all non-refrigerated potable water sources identified during the first draw sampling event were sampled to obtain samples from the lines feeding the fountains. Additionally, first draw samples were collected from the refrigerated water fountains sampled the night before, to evaluate the water that was stored in the unit overnight. Sampling was conducted early in the morning, before any potable water sources had been used for the day and prior to the arrival of any students or faculty. Maintenance personnel reactivated the water fountains prior to sampling, and the fountains were flushed for 30 seconds before sample collection, and the water fountains were deactivated and taken out of service immediately following the sampling. One additional sample was also collected from the supply at the point of entry to the building. This line was also flushed for 30 seconds prior to sample collection.

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The EPA has established an action level for public water supply systems at 15 micrograms of lead per liter of water (15 µg/L). Further, EPA recommends that schools remove water fountains and other outlets used for consumption if lead levels exceed 20 µg/L. Though these schools use water from the municipal water supply and therefore do not qualify as a public water supply system, Tioga recommends that the more conservative EPA action level of 15 µg/L be used in the decision-making process as to the continued operation of the potable water sources at each school.

**Results Based on Laboratory Analysis:**

Tables 1-4 on the following pages summarize the sampling locations, laboratory analytical results, and EPA action level for lead in drinking water. Sample results with a "<" symbol did not contain lead content above the laboratory detection limit. Samples highlighted in yellow exceeded the EPA action level for lead. A dash indicates that a sample was not collected. These tables include results from both the first draw sampling performed on September 12, 2017 and the follow-up flush sampling performed on September 25<sup>th</sup> and 26<sup>th</sup>.

**Table 1**  
**Summary of Analytical Results - Dunbar Elementary School**

Sample ID	Sample Location	First Draw Sampling Lead (9/12/2017) (µg/L)	Post 15-Minute Flush Sampling Lead (µg/L)	Post 30-Second Flush Sampling Lead (µg/L)	EPA Action Level (µg/L)
18-1	Water Fountain Near Room 111A (Bubbler)	1210	-	69.0	15
18-2	Low Water Fountain Near Room 107	60.7	<0.500	<0.500*	
18-3	High Water Fountain Near Room 107	40.3	<0.500	<0.500*	
18-4	Water Fountain Near Room 104C (Bubbler)	129	-	6.15	
18-5	Low Water Fountain East Side of Cafeteria	25.5	5.51	3.40*	
18-6	High Water Fountain East Side of Cafeteria	17.6	4.05	3.43*	
18-7	Low Water Fountain West Side of Cafeteria	115	1.96	4.73*	
18-8	High Water Fountain West Side of Cafeteria	102	3.27	4.44*	
18-9	Cafeteria Sink West	1.86	-	-	
18-10	Cafeteria Sink East	0.762	-	-	
18-11	Cafeteria Sink Far East	1.24	-	-	
18-12	Water Fountain Near Room 313A (Bubbler)	160	-	32.6	
18-13	Low Water Fountain Near Room 309	64.6	<0.500	<0.500*	
18-14	High Water Fountain Near Room 309	47.8	<0.500	<0.500*	
18-15	Water Fountain Near Room 303 Girls' Restroom (Bubbler)	32.4	-	6.99	
18-16	Water Fountain Near Room 203 Girls' Restroom (Bubbler)	548	-	0.833	
18-17	Low Water Fountain Near Room 213 Boys' Restroom	57.6	<0.500	<0.500*	
18-18	High Water Fountain Near Room 213 Boys' Restroom	40.5	<0.500	<0.500*	
18-19	Teachers' Lounge Sink - Right	1.09	-	-	
18-20	Teachers' Lounge Sink - Left	<0.513	-	-	
18-21	Gym Water Fountain	<0.513	-	-	
18-SL	Supply Line at Building Entry	-	-	0.999	

(µg/L) = Micrograms of lead per liter of water (parts per billion)

- = Not Sampled

- \* These samples were collected as a first draw on refrigerated water fountains

**Table 2**  
**Summary of Analytical Results - Oakhaven Middle & High School**

Sample ID	Sample Location	First Draw Sampling Lead (9/12/2017) (µg/L)	Post 15-Minute Flush Sampling Lead (µg/L)	Post 30-Second Flush Sampling Lead (µg/L)	EPA Action Level (µg/L)
31-1	High School – Water Fountain Across from Room 219	5550	-	29.1	15
31-2	Middle School – Water Fountain Across from Room 223	47.6	-	2.93	
31-3	Middle School – Water Fountain Near Room 224	26.1	-	1.44	
31-4	High School – Water Fountain Across from Room 218	89.0	-	7.45	
31-5	High School – Water Fountain Across from Room 214	2290	-	18.7	
31-6	High School – Water Fountain Across from Room 212	822	-	27.6	
31-7	High School – Water Fountain Near Room 210	13.6	-	-	
31-8	High School – Water Fountain Across from Room 208	1.75	-	-	
31-9	High School – Water Fountain Across from Room 113	1270	-	13.1	
31-10	High School – Water Fountain Across from Room 120	18.1	-	0.678	
31-11	Middle School – Water Fountain Across from Room 126	364	-	6.80	
31-12	Middle School – Water Fountain Near Room 121	1.05	-	-	
31-13	Cafeteria Water Fountain	86.8	<0.500	<0.500*	
31-14	Vocational / Band Water Fountain	57.2	0.793	<0.500*	
31-15	ROTC Water Fountain	8.98	-	-	
31-16	High School – Gym Water Fountain	6.87	-	-	
31-17	Water Fountain in Football Locker Room	<0.513	-	-	
31-18	Middle School – Gym Water Fountain	1.59	-	-	
31-19	High School – Auditorium Double Water Fountain	7.29	-	-	
31-20	High School – Auditorium Single Water Fountain	592	Removed from Service		
31-21	Elementary – Water Fountain Near Room 101 (Bubbler)	58.1	-	<0.500	
31-22	Elementary – Tall Water Fountain Near Room 101	0.558	-	-	
31-23	Elementary – Water Fountain Near Room 203 (Bubbler)	0.859	-	-	
31-24	Elementary – Cafeteria Water Fountain	0.909	-	-	
31-SL	Supply Line at Building Entry	-	-	1.54	

\* These samples were collected as a first draw on refrigerated water fountains

**Table 3**  
**Summary of Analytical Results - Westwood High School**

Sample ID	Sample Location	First Draw Sampling Lead (9/12/2017) (µg/L)	Post 15-Minute Flush Sampling Lead (µg/L)	Post 30-Second Flush Sampling Lead (µg/L)	EPA Action Level (µg/L)
32-1	White Water Fountain Across from Art Room	658	-	24.1	15
32-2	Gray Water Fountain Across from Art Room	2.53	-	-	
32-3	Water Fountain Across from Room 218	9.74	-	-	
32-4	Water Fountain Across from Room 213	20.0	-	6.78	
32-5	Water Fountain Across from Room 209	121	-	2.31	
32-6	Water Fountain Across from Room 205A	227	0.758	<0.500*	
32-7	Water Fountain Across from Room 201	12.7	-	-	
32-8	Water Fountain Across from Room 115	25.7	-	4.74	
32-9	Water Fountain Across from Room 116 (Cooler)	36.5	2.37	57.8*	
32-10	Water Fountain Across from Room 126	14.4	-	-	
32-11	Water Fountain Next to Boys' Room Lobby	13.2	-	-	
32-12	Water Fountain Next to Room 136	2.99	-	-	
32-13	Water Fountain Across from Room 101	23.9	-	3.24	
32-14	Water Fountain Across from Room 107	10.0	-	-	
32-15	Water Fountain Across from Room 111	66.8	0.738	2.89*	
32-16	Water Fountain Next to Mechanical Room	8.81	-	-	
32-17	Water Fountain Between Rooms 124A & 124B	28.4	2.07	3.84*	
32-18	Water Fountain Right of Room 124B	289	<0.500	12.6*	
32-19	Water Fountain Between Bathroom Next to VOC1	77.8	<0.500	1.29*	
32-20	SAA Bathroom Water Fountain	10.6	-	-	
32-21	Water Fountain in Gym Lobby	82.6	<0.500	1.00*	
32-22	Short Water Fountain in Gym Lobby (Broken- No Sample)	NA	-	-	
32-23	ROTC Water Fountain	0.792	-	-	
32-SL	Supply Line at Building Entry	-	-	5.68	

(µg/L) = Micrograms of lead per liter of water (parts per billion)

- = Not Sampled

\* These samples were collected as a first draw on refrigerated water fountains

**Table 4**  
**Summary of Analytical Results - Whitehaven Elementary School**

Sample ID	Sample Location	First Draw Sampling Lead (9/12/2017) (µg/L)	Post 15-Minute Flush Sampling Lead (µg/L)	Post 30-Second Flush Sampling Lead (µg/L)	EPA Action Level (µg/L)
34-1	Water Fountain Across from Room 121 (Bubbler)	32.3	-	<0.500	15
34-2	Water Fountain Near Bookstore – Left	5.96	-	-	
34-3	Water Fountain Near Bookstore – Right	6.69	-	-	
34-4	Water Fountain Across from Room 116 - Left	<0.513	-	-	
34-5	Water Fountain Across from Room 116 – Right	<0.513	-	-	
34-6	Water Fountain Across from Room 122 (Bubbler)	58.2	-	15.5	
34-7	Water Fountain Across from Room 119 (Bubbler)	232	-	14.1	
34-8	Cafeteria Water Fountain - Left	11.8	-	-	
34-9	Cafeteria Water Fountain – Right	22.1	<0.500	0.917*	
34-10	Cafeteria Big Sink	1.34	-	-	
34-11	Cafeteria Small Sink	27.0	-	<0.500	
34-12	Second Floor Teacher's Lounge Sink	<0.513	-	-	
34-13	Water Fountain Across from Room 212 - Left	<0.513	-	-	
34-14	Water Fountain Across from Room 212 - Right	<0.513	-	-	
34-15	Water Fountain Across from Room 214 - Left	<0.513	-	-	
34-16	Water Fountain Across from Room 214 - Right	<0.513	-	-	
34-SL	Supply Line at Building Entry	-	-	2.65	

(µg/L) = Micrograms of lead per liter of water (parts per billion)

- = Not Sampled

\* These samples were collected as a first draw on refrigerated water fountains

**Table 5**  
**Summary Table of Locations with Elevated Flush Sampling Results**

Sample ID	Sample Location	First Draw Sampling Lead (9/12/2017) (µg/L)	Post 15-Minute Flush Sampling Lead (µg/L)	Post 30-Second Flush Sampling Lead (µg/L)	EPA Action Level (µg/L)
Dunbar	Water Fountain Near Room 111A (Bubbler)	1210	-	69.0	15
	Water Fountain Near Room 313A (Bubbler)	160	-	32.6	
Oakhaven	High School – Water Fountain Across from Room 219	5550	-	29.1	
	High School – Water Fountain Across from Room 214	2290	-	18.7	
	High School – Water Fountain Across from Room 212	822	-	27.6	
Westwood	White Water Fountain Across from Art Room	658	-	24.1	
	Water Fountain Across from Room 116 (Cooler)	36.5	2.37	57.8*	
Whitehaven	Water Fountain Across from Room 122 (Bubbler)	58.2	-	15.5	

A review of the laboratory analytical results of the water samples collected during the post-flush sampling revealed a total of eight samples at the four schools with total lead concentrations above the EPA action level for drinking water. These samples are summarized in Table 5 above. The sample collected from the supply lines at the point of entry to each of these buildings was below the EPA action level for lead.

### **Recommendations:**

Based upon the laboratory analytical results of the potable water samples collected from these four schools, Tioga recommends that the water sources identified in the table above that exceeded the EPA action level during the Post 30-Second Flush Sampling event be removed from service and the associated water supply line capped, as post-flush sampling results indicate a source of lead contamination in the immediate water supply system for these fountains. Any water fountain built or installed before 1988 has a greater potential for containing lead piping, lead based parts and materials, and/or lead based solder. Particular care in the flushing, monitoring, and maintenance of these water fountains should be taken due to the lack of regulation concerning lead containing materials used during water fountain construction, installation, and maintenance.

The EPA provides technical guidance for reducing lead in drinking water in schools published in the October 2006 revision of the “*3Ts for Reducing Lead in Drinking Water in Schools*”. Tioga recommends that a plan be developed and implemented in accordance with this guidance for flushing of potable water sources not subject to removal with elevated lead levels in first-draw samples, especially following extended periods of non-use such as weekends, holidays, and breaks.

### **Limitations**

Potable water sources with elevated lead levels may potentially be present in areas of the property that are not addressed with this report. This investigation only included the potable water sources specifically addressed.

We appreciate the opportunity to provide you with this service. Should you have any questions regarding this report, please contact me at (901) 791-2432.

Sincerely,

**TIOGA ENVIRONMENTAL CONSULTANTS, INC.**



Margaret F. Strom, QEP, CHMM  
President